

1   **WHAT IS CLAIMED IS:**

2           1. A quadrature oscillator comprising:

3           two symmetrical oscillators (11) (12), each being connected by two  
4   transistors (M1, M2) (M3, M4) self-coupled in a positive feedback structure to  
5   produce negative resistance;

6           two LC circuits (13) (14), being connected to the respective oscillator  
7   (11) (12) to produce positive resistance offsetting the negative resistance through  
8   the above oscillator (11) (12);

9           two coupling circuits (15) (16) being series connected to the respective  
10   oscillators (11) (12) and LC circuits (13) (14) to produce quadrature phase  
11   outputs; wherein the two coupling circuits (15) (16) are each formed by two  
12   transistors (M5, M6), (M7, M8); whereby

13          gate terminals of the transistor pairs (M5, M6), (M7, M8) are  
14   respectively connected to the drain terminals of the transistor pairs (M1, M2)  
15   (M3, M4) in the oscillators (11) (12),

16          the transistor pairs (M5, M6), (M7, M8) are respectively connected to  
17   constant current sources (17) (18); and

18          drain terminals of the transistor pairs (M5, M6) (M7, M8) in the coupling  
19   circuits (15) (16) are respectively connected in series to the source terminals of  
20   the transistor pairs (M1, M2) (M3, M4) in the oscillators (11) (12).

21          2. The quadrature oscillator as claimed in claim 1, wherein the two  
22   transistor pairs (M5, M6) (M7, M8) in the coupling circuit (15) (16) are series  
23   connected to the transistor pairs (M1, M2) (M3, M4) in the oscillators (11) (12) to  
24   share the same current sources, and the gate terminals of the transistors (M5, M6)

(M7, M8) in the coupling circuits (15) (16) are cross-coupled to outputs of LC circuits (13) (14) at junctions (V0, V180, V270, V90) to produce output signals with 90 degrees phase shift.

3. The quadrature oscillator as claimed in claim 1, wherein the oscillators (11) (12) are series connected by the constant current sources (17) (18), which are formed by n-channel MOSFET.

4. The quadrature oscillator as claimed in claim 1, wherein the oscillators (11) (12) are series connected by the constant current sources (17) (18) which are formed by p-channel MOSFET.

5. The quadrature oscillator as claimed in claim 1, wherein the LC circuits (13) (14) are each formed by a pair of symmetrical inductors and varactors.

6. The quadrature oscillator as claimed in claim 2, wherein the LC circuits (13) (14) are each formed by a pair of symmetrical inductors and varactors.

7. The quadrature oscillator as claimed in claim 3 wherein the LC circuits (13) (14) are each formed by a pair of symmetrical inductors and varactors.

8. The quadrature oscillator as claimed in claim 4, wherein the LC circuits (13) (14) are each formed by a pair of symmetrical inductors and varactors.